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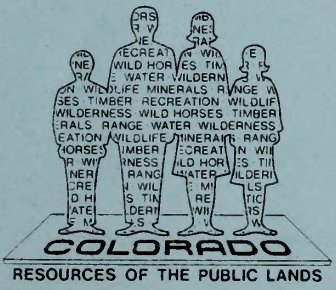
Development of Energy Minerals in Northwest Colorado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RESOURCES OF THE PUBLIC LANDS

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Development of Energy Minerals in Northwest Colorado

COLORADO
RESOURCES OF THE PUBLIC LANDS

DEVELOPMENT OF ENERGY MINERALS
IN
NORTHWEST COLORADO

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Figure 1 - Locations of Energy Minerals in Northwest Colorado.

Figure 2 - Oil Shale Status, Piceance Creek Basin, Colorado
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Figure 3 - Oil Shale Patent Application Status.
Map & List

IN REPLY REFER TO

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
COLORADO STATE OFFICE
ROOM 700, COLORADO STATE BANK BUILDING
1600 BROADWAY
DENVER, COLORADO 80202

Anyone who thought the northwest region of Colorado was experiencing a rapid industrial expansion a few short years ago will hardly be able to comprehend the forthcoming one as it will be so great in comparison. The greatest impetus will still stem from coal and oil shale. As the pace accelerates, problems associated with rapid development in a sparsely populated area will increase at an even greater rate than the development.

This region has tremendous quantities of energy minerals ripe for development. In addition to coal and oil shale, oil and gas, uranium, nahcolite and dawsonite (associated with oil shale), and sand and gravel are present, some of which are in various stages of development. Prominent among the energy minerals are the oil shale deposits in Piceance Basin. The total energy potential in these deposits may approach that controlled by the OPEC nations. Research has been carried to the point where technologically it appears these deposits can be developed and shale oil produced. This shale oil (kerogen) can be converted to typical petroleum-end products.

Other major associated projects that will proceed simultaneously with energy minerals development include product pipelines, power lines, water impoundments, diversions, pipelines and pumping plants, highways, railroads and by-product plants.

All of the above development activity is occurring in an area which contains the following significant nonmineral resources which will be impacted: people, communities and towns, wildlife, water, recreation, wild horses, archaeology and historic features, and livestock forage.

Approximately 38% of the seven-county northwest region of Colorado and nearly 80% of Piceance Creek Basin are public lands managed by BLM. In addition, the minerals on about 20% of the private lands are owned by the federal government and managed by BLM. Because of this land ownership pattern, energy mineral developments and/or their associated off-site facilities will be located primarily on public land. Similarly, urban expansion will involve land managed by the Bureau. BLM will be involved in nearly every development activity decision.

The land tenure situation is also a major obstacle to a multi-resource management program for the Piceance Creek Basin. Over 40% of the Basin, or approximately 400,000 acres, are encumbered by pre-1920 oil shale

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mining claims. The horseshoe-shaped pattern of mining claims hinders BLM's ability to create economically feasible mining units. Additionally, activities on these mining claims hampers management of nonmineral resource values.

To achieve the goals of energy production, environmental protection (surface resource management) and orderly community growth will require a great many well-coordinated and timely actions by federal, state and local agencies and industry.

The Under Secretary has made a decision to expand the prototype oil shale program by leasing up to four new tracts. This action responds to President Carter's program to accelerate the development of a synthetic fuels industry, aiming at 400,000 barrels of shale oil a day by 1990. The tracts to be offered will be for specific methods of resource recovery with lease stipulations to encourage development of the specified technology. At least one tract would be delineated to encourage multi-mineral development.

The challenge is to assess the resource potentials, identify and weigh the gains and losses, and make decisions or recommendations that, in balance, best meet the needs of the American people.

Sincerely,

Charles W. Luscher

CHARLES W. LUSCHER
Acting State Director

PICEANCE BASIN OIL SHALE

PROGRAM SUMMARY

Situation and Problem

The largest and richest oil shale deposits in the world containing estimated quantities as high as 1.25 trillion barrels of recoverable oil are situated in the Piceance Basin in northwestern Colorado.

A major issue identified in the FY 1982-1985, 4-Year Authorization process was the need for coordination and development of a federal oil shale program. Several problems are presented; title clearance on oil shale lands, needs for complete inventories, followed by multiple-use resource planning, environmental assessment, activity planning, and a controlled leasing program. The state of Colorado identified a need for a phased program to control the influx of people associated with energy development.

The BLM has the opportunity to be in the forefront in development of an oil shale program to utilize this abundant supply of domestic oil. If the major components identified in this program are met (long-term multi-mineral plan for the Piceance Basin, title clearance, and inventories), BLM and industry may move on a parallel track and be ready to lease additional tracts on BLM lands and provide private industry support in their developments by 1985.

Objectives

The major objective is to design and manage a program for orderly development of the oil shale resource of northwest Colorado using the following steps:

1. Conduct inventories, clear title, develop plans and environmental assessments to allow the BLM to issue leases for oil shale development and production on federal lands in concert with private oil shale development and production.

2. Prepare a multi-minerals and multiple-resource management plan for the long-term development of all nonenergy minerals and energy minerals in a manner consistent with sound land management principles, taking into consideration physical sciences, biological sciences, and socio-economic impacts.

3. Assist private development on approximately 320,000 acres of privately-owned oil shale lands by expediting exchanges, rights-of-way, and other permits on adjacent public lands.

Analysis

Eighty percent of the one million acres in the Piceance Basin oil shale area is public land administered by BLM. Most of the remaining 20 percent is private land owned by oil companies. Areas of legislative assistance needed are law changes to expedite land exchanges, water development, and appropriated monies to implement Section 317 of the Federal Land Policy and Management Act of 1976 (FLPMA), to allow for low cost loans for infrastructure growth in the communities impacted by oil shale and other energy development.

The status of inventory, planning, and activity planning is as follows:

1. The original Management Framework Plan (MFP) for the White River Resource Area was completed in 1975, updated for coal in 1977, updated for grazing in 1978, and scheduled for a coal and wilderness update in FY 1981. It is currently scheduled for a Resource Management Plan (RMP) to begin in FY 1984, and to be completed with an EIS in FY 1988.

   The 1975 MFP decision for oil shale in summary says: No new oil shale leases will be issued except as required to develop new mining methods. Leasing of additional tracts will be considered after development of the existing leases has begun. Exploration for oil shale will be allowed to continue and sites for spent shale will be provided.

2. Inventory data ranges from 1941 range survey date to more recent archaeology and endangered species inventories for small portions of the Piceance Basin. Basically, inventory needs will have to be thoroughly analyzed during initial planning stages to develop a systematic inventory plan.

3. Activity planning for wildlife has been completed. The range management EIS to be completed in FY 1980, will form the basis for activity planning and implementation of the range program.

Considering all of the resources in the Piceance Basin, it is necessary that a multi-minerals activity plan be prepared allowing for maximum utilization of mineral resources while still protecting the other resource values.

Program Formulation

While this proposal addresses primarily those needs for a longer-term leasing program, the recent Secretarial Issue Document decisions calling for additional leasing under the prototype leasing program will possibly require a somewhat modified approach for the short term.

First, whether or not the requirements of the 1975 MFP have been met (as previously mentioned) will have to be decided. Second, additional lease-tract areas will have to be delineated with subsequent inventory, planning, and environmental assessment.

These two cannot be accomplished given the program dollars or FTP ceilings available. It is estimated that an additional 2.926 million dollars and a maximum of 38 additional positions would be needed to meet this end. This funding and manpower would be spread over a 5-year period as shown in the following table:

	Cost ($000)	Positions (FTP)
FY 1981	48	2
FY 1982	1,044	5
FY 1983	1,286	38
FY 1984	280	13
FY 1985	268	14
Total	2,926	

The formulation of a long-term program would entail much more work.

A major assumption made is that initial long-term lease areas will avoid areas of unpatented mining claims recorded under Section 314 of FLPMA and areas containing claims pending mineral patent applications. Of the 680,000 acres of BLM-administered land in the basin, 400,000 acres are encumbered by unpatented mining claims.

The first phase of the long-term program would include inventories for soils, minerals, archaeology, wildlife, endangered plants, air quality, water, range, water rights, cadastral survey needs, recreation and energy mineral rehabilitation inventory and analysis.

The second phase would include planning and a multi-minerals activity plan considering rights-of-way corridors, transportation systems, development of location, relationship of other resources, and mitigation of damages and protection of remaining resources in the basin.

The third phase would be environmental documentation to allow use authorization with protective stipulations. With an oil shale programmatic EIS as suggested in the memo Decisions on the Oil Shale Secretarial Issue Document, some of the environmental workload may be reduced.

The following table summarizes manpower and dollar needs for implementing the longer-term oil shale program in the Piceance Basin:

	Cost (000)	Positions PFT	Positions Temp
FY 1981	6,373	70	33
FY 1982	6,508	72	31
FY 1983	3,108	71	24
FY 1984	4,030	79	32
FY 1985	2,465	62	19
Total	22,484*		

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*Built into these costs are doing all necessary inventory in FY 1981, 1982, and embarking upon an aggressive mining claim and mining law administration program, and preparation of at least two regional EISs. One covering Bureau-motion leasing, the other covering siting of ancillary facilities on federal land for private oil shale development (rights-of-way, transportation systems, etc.).

ENERGY MINERALS RESOURCES

The northwest region of Colorado is rich in energy-mineral resources. (See Figure 1.) Development of any one or all of them represents a paradox of meanings. In relation to the national energy dilemma, development is heralded by some as a panacea. And, in respect to industry, local governments, environmentalists, and to BLM, development represents a gargantuan problem in the area of planning, services and action versus reaction.

Increased development of these minerals is already taking place. What impact this development will have upon the existing environment poses many questions. There is no single, simple answer. No one really knows the wide-ranging scope or complete timetable of development. The first step, however, must be in accepting the realization that any program of the magnitude promised cannot be looked upon as an isolated activity. All resources will feel the effects.

OIL SHALE

The oil shale reserves of the Green River formation of Colorado, Utah and Wyoming, are estimated to be 1,842 billion barrels of oil in rock producing 15+ gallons per ton. Of this amount, the Piceance Creek Basin of Colorado contains estimated reserves of 1,200 billion barrels. These are "in place" reserves without consideration for losses during recovery. Though Colorado has the smallest geographic area of oil shale, it has the richest, thickest and best-defined deposits. It is predicted that oil shale development will be greatest in Colorado.

The existence of oil shale in the Piceance Creek Basin has been known since the turn of the century. The process to extract oil from the shale, called retorting, has also been generally recognized since the mid-1800s. Actual production of shale oil first occurred in Scotland in 1850. In Colorado, some oil was retorted from oil shale mined in the southern part of Piceance Creek Basin near DeBeque about 1910-1920. To date, shale oil has not been able to compete with conventional petroleum resources in a competitive market, but the economic situation is changing. Increasing prices for foreign oil, relaxation of price controls for domestic oil, and various financial incentives passed or near passage in Congress (tax credits, Synthetic Fuels Corporation, etc.) have combined to make oil shale development much more attractive from an economic perspective. In addition, the Air Force is looking toward future-type contracts to provide a guaranteed market for shale oil based jet fuels. Consideration is being given to buying 100,000 bbls per day of shale oil and of meeting the fuel requirements of Hill Air Force Base in Utah from this source.

In Colorado, the emerging industry and the impacts on BLM-managed resources will be founded both on Federal leases and on private shale developments. Development is proceeding on the two Federal leases in Colorado. In addition, the Colony Development Operation will begin construction activity this summer with a commitment to be on line by 1985, and Union Oil Company appears ready to proceed. Further, Chevron Oil Company is conducting feasibility studies which may lead to development of its oil shale properties in Colorado. Finally, the decision of May 27, 1980 to expand the prototype program and to develop a long-term leasing program each will place further demand on Colorado resources and lead to additional development.

FEDERAL PROTOTYPE LEASING PROGRAM

The prototype oil shale leasing program was adopted in late 1973 and the first lease sales were held in early 1974. Six tracts were offered, two each in Colorado, Utah and Wyoming. Only four tracts were leased since no bids were submitted for the Wyoming tracts.

Both Colorado leases will be developed using a modified in-situ technology. In this method, the major portion of the shale is retorted underground in chambers from which 20 to 40 percent of the shale has been removed and the balance reduced to rubble by blasting. That portion of the shale removed will be processed in surface retorts. The Bureau of Land Management and the U. S. Geological Survey are the principal agencies involved in management of lease activities. In June 1974, the Survey established the Area Oil Shale Office in Grand Junction to supervise operations on the tracts and ensure their compliance with lease terms. BLM and the Survey are advised on environmental aspects of the prototype program by the Oil Shale Environmental Advisory Panel. The panel, established by the Secretary of the Interior, is made up of State, Federal, industry and environmental representatives.

The recent decision to expand the prototype program with up to four additional leases, one of which will be for multi-mineral development, will almost surely mean additional prototype leasing in Colorado. This is because the best oil shale is in Colorado and, further, because virtually all of the deposits suitable for multi-mineral development are also in Colorado.

Tract C-a. This was the first lease sold; it was purchased by Standard Oil Company of Indiana and Gulf Oil Corporation for a bonus bid of $210.3 million for the 5,089-acre tract. Gulf and Standard have formed a partnership company, Rio Blanco Oil Shale Company, to develop the tract. Estimated recoverable oil shale reserves within the tract are 4.07 billion barrels of oil in mineable beds containing 30 or more gallons per ton. For various legal, technical and economic reasons, operations on the lease were suspended from September 1976 to September 1977, but development began immediately after that date.

Development on Tract C-a is in what is called the modular development phase by the lessees. During this phase, the technology will be perfected for full-scale production. A shaft has been sunk to 970+ feet and development of two levels off that shaft is well underway. The first retort burn will begin in August 1980. Full-scale commercial production of 76,000 bbls per day (surface and underground) should be reached about 1987.

Tract C-b. The lease for Tract C-b was sold in February 1974, about a month after the C-a lease sale. Atlantic Richfield Company, The Oil Shale Corporation, Ashland Oil, Inc., and Shell Oil Company bid $117.8 million for the 5,094-acre lease. Over the years the original lessees dropped out and the lease is now held by Occidental Oil Shale, Inc. Tenneco Shale Oil Company has joined Occidental in the venture, though it does not now hold a record interest in the lease. Together they have formed the Cathedral Bluffs Shale Oil Company to develop Tract C-b. Operations on C-b were suspended for the same one-year period as on C-a, but are now progressing toward production.

Occidental has a tract of private oil shale near DeBeque on which its process development work is being carried out. Consequently, the work at C-b is being conducted on a commercial scale. Three shafts are being sunk and have reached a depth of 1100+ feet with a target depth of about 1900 feet. Both surface and underground retorting is expected to begin in early 1985 with a production of 50,000 bbl/day underground, and 32,000 bbl/day surface to be reached in 1988 or 1989. A revised development plan for the tract will be completed late 1980.

PRIVATE OIL SHALE DEVELOPMENT PLANS

Colony Development Operation had suspended plans several years ago to go into commercial production on patented lands near their "semi-works" plant on Parachute Creek near the southern edge of Piceance Creek Basin, but in April 1980, announced plans to begin the first phase, a road building and site preparation phase this summer for the $1.76 billion oil shale project. An underground room-and-pillar mine and surface retort using the TOSCO II Process is planned.

Production capacity will be in the 66,000 tons per day range producing 47,000 barrels of oil per day. They expect to employ about 2,000 workers. On-site surface disposal of the processed shale is contemplated. Colony also plans to construct a company town that will accommodate 5,000 people near the existing town of Grand Valley. An EIS has been completed, which includes consideration of their proposed pipeline right-of-way, mine, commercial plant facilities, incoming power supplies, water requirements, the new town, and a land exchange. See also the private exchange described later.

The Exxon Company has purchased Atlantic Richfield Company's (ARCO) 60 percent interest in Colony Development; TOSCO owns the remaining 40 percent interest.

Union Oil Company has announced plans to develop a commercial operation of about the same type as Colony and in the same vicinity. The initial development will be a demonstration plant to process from 1,000 to 1,500 tons per day. Then to a prototype facility at 10,000 tons per day (9,000 BD) before expanding to commercial production. This will be done to test Union's retorting process which differs somewhat from other processes tested and used by other companies. Shale will be mined by the room-and-pillar method from their property near Grand Valley.

Over $1 million is already being spent on environmental research. Ecology Consultants, Fort Collins; Bechtel, Inc., in San Francisco; Stearns-Roger, Inc., Denver (air quality); Colorado International, Inc., Boulder (upper air management); Woodward-Thorfinnson, Denver (water studies); and Department of Agronomy, CSU, for revegetation studies, are some of the studies either in progress or completed. Union has been issued permits by EPA and the Colorado Mined Land Reclamation Board.

Superior Oil Company planned to develop a combination oil shale-nahcolite-dawsonite operation on the northern edge of the basin if they were able to consolidate their land holdings through an exchange they have proposed. However, the proposal may be rejected by the Interior Department. The scale would be similar to Colony and Union, but employment would be less and all processed shale would be backfilled into the mine voids. They claim they can mine the shale without disturbing the large zone of saline water in the basin. They have a field office in Meeker near the development site and are engaged in predevelopment engineering, environmental studies, and negotiations on land exchanges, etc. See also the exchange proposal described later.

Occidental Oil Shale, Inc., is actively engaged in a pilot operation on a 4,300-acre tract in the Roan Creek drainage (Logan Wash) near the southern edge of the basin, as well as on the C-b site. They have stated publicly that they expect to go commercial. They have a modified in-situ process that involves limited underground mining, requires practically no water, and requires very little surface disposal of mine waste (no processed shale disposal). See also the DOE research contract described later.

Paraho Project. The U. S. Bureau of Mines has leased the Anvil Points Research Facility near Rifle, Colorado, to Development Engineering, Inc., project operator for the 17 participants in the joint venture, consisting of large and small oil companies, utility companies, engineering, mining and construction firms.

The project was scheduled for a 30-month duration, during which time the Paraho process (a process that has been used successfully in the past in calcining of limestone) was to be completely tested for its applicability to extraction of oil from oil shale. The project is currently inactive, and Paraho has announced that it will move its operation to leased state of Utah land 40 miles southeast of Vernal, Utah.

IN SITU OIL SHALE RESEARCH CONTRACTS with the DEPARTMENT of ENERGY

Occidental Oil Shale, Inc. Phase II of the Occidental Oil Shale, Inc.'s cooperative agreement became effective in June 1979.

Planned for Phase II is the demonstration of the development and simultaneous processing of two side-by-side large-scale horizontal free face retorts. Accompanying this, a number of development programs are planned. Advanced retort ignition systems will be developed and tested. The instrumentation program will be expanded to include remote sensing equipment being developed by the DOE. This equipment will be tested to measure mine stability, to evaluate rubble, to monitor burner operation, retorting, and post burn behavior. Mine stability data for commercial-size retorts will be developed. Special mining equipment for commercial use will also undergo development and testing.

Shale mined during development work will be stockpiled for a while, but ultimately it will be retorted. Plans include the waterflooding of an old retort to study the amount of soluble salts dissolved.

Equity Oil Company. The objective of this project is to determine the technical feasibility of using superheated steam as a heat-carrying medium to retort in situ the oil shale in the Green River Formation leached zone. The leached zone at the Bx site, located approximately 60 air-miles north of Grand Junction, Colorado, is an oil shale resource equivalent to about one million barrels of shale oil per acre. It has native permeability which should allow recovery of the shale oil without additional rubbling or fracturing.

A pattern of five production wells and eight injection wells has been completed in the leached zone and steam injection has been initiated. The project has been plagued by new equipment failures, but most of these have been overcome. Site injectivity and water productivity are not up to design rates, but remedial action is being taken to alleviate the problems. Experimental work in the laboratory research program is nearing completion and the results should be published soon. The laboratory work is being done at the University of Utah.

Steam is injected at 1000°F. About 3,100 barrels of water (as steam) are injected daily. Production wells are of the gas-lift type. Eight steam injection wells are being utilized.

BUREAU of MINES, BUREAU of LAND MANAGEMENT and MULTI MINERAL CORPORATION, MEMORANDUM of UNDERSTANDING, NO. 14-09-0070-799 REGARDING USE OF THE HORSE DRAW RESEARCH FACILITY DEEP SHAFT

In FY 79, the Bureau of Mines received insufficient funds to complete the entire Mining Environmental Research (MER) program. As a result, all subactivities were cut and the decision was made to discontinue the multi-year project of environmental research and geotechnical test work at the Horse Draw research shaft in the Piceance Creek Basin. It was concluded that unless there was significant interest and funding participation by industry and/or other government agencies the Bureau would close down the shaft.

On December 7, 1978, the status of the research shaft was discussed at a briefing attended by 47 industry representatives, 10 Federal agency representatives and 13 people from the Bureau of Mines. At that time, the Bureau of Mines asked that anyone interested in participating in research at the shaft submit a letter of intent within a month.

Indications of interest were received from eight organizations. This number was soon narrowed down to three. The Bureau of Mines and Bureau of Land Management negotiated a memorandum of agreement with the company that submitted the best offer. (Multi Minerals, Inc.), effective April 30, 1979.

Multi Mineral Corporation agreed to use the facility to conduct a two-phased research program to obtain mining, environmental and geotechnical test data and bulk samples of nahcolite, oil shale and dawsonite. Phase one of the program consists of core drilling, drifting 100 feet from the shaft in a rich nahcolite zone and, from the end of the drift, mining four test rooms arranged around a central pillar. Phase two of the program is to develop a simulated in situ retort by mining a 100-foot vertical section between two yet-to-be determined mining levels to be developed from the shaft.

Multi Mineral Corporation's research program is currently in progress.

OIL SHALE MINING CLAIM CONFLICTS

Situation and Problem

The Piceance Creek Basin contains approximately 750,000 acres of public lands, and approximately 69,000 acres of surface patented land with reservations to the United States of oil and gas and oil shale and/or other minerals. The 750,000 acres is covered by numerous unpatented pre-1920 oil shale placer mining claims to the extent of approximately 190,000 acres. (See Figure 2.) These claims, some of which are presently in mineral patent applications, will conflict with the proposed additional prototype oil shale leasing program, or with realty actions (exchanges, R/W's, etc.) unless total development is confined to the central portion of the Piceance Creek Basin. The current workload consists of 27 oil shale patent applications covering over 60,000 acres of public land. (See Figure 3 and list.) The test cases involving the oil shale discovery issue in two patent applications (U. S. v. Frank W. Winegar, Shell Oil Co. - Intervenor, et al., and D. A. Shale, Inc. contests 359 and 360) were initiated in 1964, and these two cases were ruled on June 2, 1980 by the U. S. Supreme Court after an adverse ruling by the Court of Appeals, 10th Circuit, dated January 25, 1979. Shell Oil Company and D. A. Shale, Inc. v. Cecil D. Andrus, Secretary of the Interior, No. 77-1346. The Supreme Court ruled that the Government is constrained in the application of the usual test of discovery and, if other issues are not applicable, will be obligated to patent all 27 applications and numerous other as yet unfiled applications, which will be filed when all impediments to oil shale patenting are removed. If this situation occurs, a considerable backlog in patent applications is anticipated. It is possible that over 190,000 acres of public land in the Piceance Creek Basin could go to patent, depending on proper recordation under Sec. 314 of the FLPMA of the oil shale claims and the filing of acceptable mineral patent applications showing the performance of substantial assessment work as required by law.

Objectives

The main long-term objective is to remove the conflict of unpatented mining claims with full development of all of the mineral resources, including oil and gas and oil shale and sodium and aluminum within the Piceance Creek Basin with a program to clear title of the Federal lands. A secondary objective is to continue processing the existing oil shale mineral patent applications, especially those presently under a Federal court order to handle "expeditiously" (e.g., Civil Action C-4361 Amerada Hess Corporation, the Louisiana Land and Exploration Company, and the Oil Shale Corporation v. Secretary of the Interior, Order dated February 17, 1977. Also, to adjudicate four new oil shale patent applications and examine them and other applications under the June 2, 1980 criteria directed by the U. S. Supreme Court in the Shell Oil Co., et al., case, and the December 8, 1970 criteria on assessment work in the U. S. v. Oil Shale Corp., et al., case (400 U. S. 48).

Analysis

Additional legislation, such as repeal of the mining laws, could drastically increase the workload and backlog if mandatory patent applications are required. The most important consideration, however, is the effect of the Supreme Court's June 2, 1980 decision on the criteria currently used to determine validity of OS claims. Applying the June 2, 1980 decision would require the clear-listing of pending and future oil shale patent applications if sufficient assessment work has been done, and the claims are recorded under Sec. 314 of FLPMA and there are no location or title problems. The end result would be the patenting of all oil shale lands in Colorado, Utah and Wyoming, which are covered by pre-1920 oil shale mining claims for which an applicant can show possessory title and a discovery to meet the Freeman v. Summer (52LD201) and the June 2, 1980 and December 8, 1970 decision tests.

This mining law administration program will remove substantial acreage of public lands from further consideration for leasing, because the lands covered with mining claims may be patented. The objective is to contribute to the nation's daily petroleum needs and help replace 8.64-million barrels-per-day of imported oil. The level of production of oil and gas and shale oil within the Piceance Creek Basin depends upon the stimulation of deep drilling efforts to discover another Rangely oil field in the Weber Formation deeply buried in the basin and/or oil shale industry effort to produce shale oil from eiher the private oil shale lands (approximately 320,000 acres), or leased federal lands. The current projected output of prototype oil shale development would contribute an insignificant amount of the daily petroleum needs of the nation. Only very large scale development, such as that suggested in the following Bureau of Mines studies, would produce an amount of shale oil significant enough to supply a part of the nation's daily requirements.

Technical and Cost Evaluation of Candidate Large Scale Open Pit Oil Shale Mining Methods in Colorado by Sun Company, Suntech, Inc., July, 1976; and Technical and Economic Study of the Modified In Situ Process for Oil Shale" by Fenix and Scisson, Inc., November, 1976; and A Technical and Economic Study of Candidate Underground Mining Systems for Deep, Thick Oil Shale Deposits by Cameron Engineers, July, 1975.

PROGRAM FORMULATION and DESCRIPTION of PROPOSED ACTION

There are three alternatives available:

a. Avoid the areas covered by pre-1920 oil shale mining claims in selecting proposed oil shale lease tracts. This can be done by only considering tracts in the upper central portion of the Piceance Creek Basin.

b. Implement the title clearance program using the criteria of the June 2, 1980 Supreme Court decision and the December 8, 1970 Supreme Court decision U. S. v. Oil Shale Corporation, et al., (400 U. S. 48).

c. Select a lower level title clearance program and only clear claims in mineral patent applications, and in direct conflict with proposed private exchanges, R/W's and other realty actions.

The selection of alternative a. will avoid the permanent position personnel ceilings, but will seriously confine the area for leasing consideration.

OTHER LEGAL ACTIONS

In addition to the oil shale mining claim litigation in Colorado and the litigation over title to oil shale lands and resources in Utah, which involves the state, oil shale mining claims, and applicants for state leases, as well as the Federal Government, two lawsuits were instituted against the Prototype Program by environmental groups. The first, filed in December 1976, challenged the legality of the suspensions. It was dismissed for failure to include the lessees as indispensable parties. The second suit, filed in December 1977, by the Environmental Defense Fund, the Colorado Open Space Council, and Friends of the Earth, challenged the approval of the Development Plans for the two Colorado projects, arguing that additional Enviornmental Impact Statements should be required. The Federal District Court rejected that argument and affirmed the Department's actions under the Prototype Program on August 25, 1978. An appeal on that decision affirmed the District Court decision. Also, on May 19, 1980, the U. S. Supreme Court ruled in favor of the United States concerning the State of Utah indemnity selections to over 157,000 acres of oil shale lands, including the two Utah lease tracts.

OIL SHALE PRIVATE EXCHANGE PROPOSALS

Private Ownership : There are about 35,000 acres of land in the Piceance Creek Basin owned by various oil companies and individuals, the owners of which may enter the development picture in the near future. In the past 7 to 10 years, BLM has been contacted by nine of these companies concerning land exchanges. Company objectives are to consolidate their holdings into economical, mineable units.

The following are active oil shale related exchange proposals:

C-25650	Colony Development Operation (this exchange was completed in early 1980)
C-19958	Superior Oil Company
C-22933	Getty Oil Company
C-21840	Getty Oil Company
C-29776	Exxon Coal Company

SUPERIOR OIL COMPANY EXCHANGE PROPOSAL

Exchange of land and mineral estates is recognized as desirable to consolidate Federal and private minerals and surface to permit orderly, economically and environmentally sound development of private oil shale holdings and possible future extraction of Federal minerals.

Valuation of Federal and non-federal lands and minerals ownerships in a exchange proposal by Superior Oil Company depends on the lower limit selected for commercially feasible extraction of the oil shale. Under procedures for resource economic evaluation of minerals approved in January 1975, the G.S. has found a gross disparity in value between the public lands Superior needs for a logical mining unit, and the lands it has available for trade nearby. There seems to be little likelihood of completing this exchange.

The final environmental statement, which includes social, economic and other impacts of mineral development, has been filed with the Environmental Protection Agency.

GETTY OIL COMPANY PROPOSALS

Getty Oil Company has filed a petition for classification of public land and a request for revocation of the oil shale withdrawal on other lands in order to pursue an exchange northwest of DeBeque, Colorado. The company proposes to select about 1,250 acres of public land and offer 1,280 acres of company land. Getty wants to consolidate the Federal lands with its present private lands as a base for oil shale development at some future time. In the interim, the lands would be used for grazing.

Geological Survey reports that the lands are valulable for oil, gas, coal; one small parcel contains oil shale. G.S. reports that exercise of surface rights on the lands would not interfere with mineral leasing values.

An exchange has been considered for part of Getty's proposal. This portion involves only surface estates, but it is presently inactive because of conflict with a proposed wilderness study area.

EXXON COAL COMPANY LAND EXCHANGE PROPOSAL

This a large acreage proposal (approximately 11,500 acres) to consolidate Exxon's oil shale properties and, in exchange, return to Federal ownership an equal value acreage, some of it strategically located so return to Federal ownership would consolidate Federal surface and subsurface holdings in some of the richest mineral areas of the Piceance Basin; consolidation would, in addition, solve some long-standing problems of public access to large units of public lands.

Exxon's package, in addition to the exchange, includes storage and transmission of water on and across National Forest and public lands, two 230 KV power transmission lines, pipelines, a water storage reservoir and construction and operation of an underground oil shale mining and retorting project. Its proposal is long-term and environmental assessment, and development of a producing operation will require a large investment in time and money over many years.

Under present economic resource valuation constraints, there seems little likelihood of completing the exchange because of wide disparity in values between the consolidated block of public land Exxon seeks and the 25+ separate small parcels of land it would reconvey to the United States.

OTHER

Exchange of lands with Colony Development Operation was completed, but with proposed start-up of their plant, the company will need to have a products pipeline. Its originally proposed route southwesterly to Lisbon Valley in Utah, which, along with the exchange, was the basis for an environmental statement completed in 1977, is no longer viable; a pipeline northeasterly to Casper, Wyoming has been suggested. At a minimum, this will require a supplement to the 1977 ES.

STATE INDEMNITY APPLICATION

Following completion of our audit of unsatisfied indemnity rights due the State of Colorado, the State filed a selection for a 6,840-acre block of oil shale lands near Oil Shale Lease Tract C-b. No action has been taken pending the outcome of State of Utah v. Kleppe, in which the United States Supreme Court has now ruled in favor of the United States. Depending upon Colorado's wishes, we can proceed with this indemnity selection.

The State offered base lands they believe to be mineral in character - we believe this would have exhausted their mineral base, however, based on the U. S. Geological Survey report on the offered base lands, more than 2,500 acres of the total 6,840-acre base are non-mineral in character and thus could not be used to select mineral-in-character land such as the oil shale land. This problem of mineral in character within the meaning of the State Indemnity laws will have to be resolved before the SIS can proceed. U.S.G.S. has reported that exploratory drilling will be necessary to determine coal character of one parcel of base within the Southern Ute Indian Reservation.

The selected lands contain large quantities of oil shale; many of the base lands are of relatively low total value. Thus, the problem of disparity in value is likely to be a further hindrance to completion of the State's application.

The State is presently in litigation in State Courts with Occidental Petroleum Company who filed mining claims on the selected lands under a little known State law immediately after the State Selection was filed with BLM.

SUMMARY

In Summary, the current oil shale picture is this:

1. Oil shale reserves on public and private lands in the Piceance Creek Basin can be developed by the emerging oil shale industry.

2. We are involved with much more than a prototype program due to recent interest by the President and industry in developing both public and private holdings.

3. Impacts and workloads will stem from operations on both Federal and private lands. BLM will be heavily involved since about 80 percent of the oil shale reserve is under its jurisdiction.

4. There is deep citizen and political concern regarding environmental and socio-economic impacts resulting from oil shale development.

5. There is a considerable conflict with proposed OS development with unpatented oil shale mining claims, some in pending oil shale patent application.

6. Additional research needs to be done to fill data gaps identified through ongoing studies.

7. Industry and government are testing the feasibility of several types of extraction methods, some of which may facilitate shale oil production at a faster rate than anticipated. In addition, some may cause less enviornmental degradation.

8. Development of the industry will depend largely on the effectiveness in working with environment groups, advisory panels, state and local governments, other agencies and industry.

9. Oil shale development will generate many off-site activities and impacts, including proposed private exchanges of land. It cannot be developed independently. Orderly and timely development will depend greatly on meshing oil shale industry needs with those of other minerals and resources, including human resources.

COAL

Present Situation

At the end of 1979, there were 71 licensed coal mines in Colorado, with the 47 operating mines showing a total state production of approximately 18,150,000 tons for the year 1979. This is an increase of 3,790,000 tons over 1978.

About 70 percent of the coal produced was from surface coal mines. Essentially, most of the surface mined coal was used for electric power generation. The underground mine coal is used for various purposes, including electric generation, commercial uses and domestic heating.

The northwest Colorado producing areas of Routt, Moffat, Jackson, Rio Blanco, Mesa, Garfield, and Pitkin Counties produced about 75 percent of the Colorado production for a total of approximately 14,352,000 tons in 1979. This is an increase of 3.5 million tons over 1978. Routt and Moffat Counties counted for a combined total coal production of approximately 11,740,000 tons. About 70 percent of this production was from surface mines.

Since December, 1973, Colorado has issued 12 competitive coal leases and one noncompetitive coal lease. These 13 leases represent approximately 61 million tons of recoverable coal. Nine of these leases are located in northwest Colorado area. Another coal lease will be issued in the northwest area in June 1980. There are nine competitive emergency coal lease applications pending in Colorado; six of these are located in the northwest area.

Colorado has 37 Coal Preference Right Lease Applications pending; 15 of these are located in the northwest area. Eight of these are being processed into the environmental assessment phase during Fiscal Year 1980.

NEW PROGRAM

A new program for management for Federal coal resources was adopted in June 1979. Northwest Colorado is part of Green River-Hams Fork Coal Region, the region where the first competitive coal sales will be held under the new program. A lease target of 520 million tons of in place reserves has been adopted to meet a projected annual production deficit of 18.5 million tons in the 1987 through 1990 time period. Eleven tracts have been delineated and ranked in Colorado, and five in the Wyoming portion of the region. The first sales will be held in January 1981.

Predicted Growth

Most of the immediate growth within the next few years will be concentrated in the presently active mining area in the northwestern portion of the state. The main thrust will be the extension and expanding of existing mining operations.

The annual coal production for northwest Colorado by 1990 is expected to exceed 30 million tons.

A "Determination of Unsuitability for Coal Development," a supplement to the "Williams Fork Management Framework Plan Land Use Decisions," is attached as an example of the application of the unsuitability criteria to coal in the northwest Colorado area.

The following mining activities are projected for the northwest Colorado region. The most probable level of production anticipated to occur through 1990.

AMCA RESOURCES, INC.

This company has been conducting an exploration program on leased and unleased federal land coal deposits in Routt County, Colorado. AMCA Resources, Inc., plans to develop a surface coal mine three miles southwest of Oak Creek, Colorado. There are approximately 250 acres in this lease, 200 of which will be ultimately disturbed by surface mining. Production by 1990 is expected to be 250,000 tons per year.

COAL FUELS CORPORATION

Coal Fuels Corporation started construction of an underground mine in 1978 near the Hayden Power Plant four miles east of Hayden, Colorado. This mine will develop coal reserves of the Wadge and Wolf Creek seams by shaft entries. At full production, Coal Fuels Corporation's underground mine is expected to yield 2 million tons of coal per year.

COLOWYO COAL COMPANY

The Colowyo Coal Company is conducting a surface mine operation in the Axial Basin located in southeastern Moffat County. Colowyo intends to extract approximately 85 million tons of coal from eight coal seams over a 30-year period. By 1990, the Colowyo coal mine is expected to produce 3 million tons per year.

EMPIRE ENERGY COPORATION

Empire Energy Corporation is currently operating two underground mines, Wise Hill No. 5 and Wise Hill No. 9. These mines are located in Moffat County approximately six miles south of Craig, Colorado. Two new mines will be developed and begin operations by 1980, and it is expected that total annual production will reach 2.4 million tons by 1990.

ENERGY FUELS CORPORATION

Energy Fuels is producing coal from Routt County, Colorado. Energy Fuels produced approximately 3.5 million tons from three strip mines. The annual production is expected to reach 4.0 million tons by 1990.

ENERGY WEST, INC.

This company has several planned operations. Future development of most of these operations will involve private or state lands and some federal lands.

The Sugarloaf Mine is scheduled to start in 1981, and is located approximately 15 miles west of Craig and south of U. S. Highway 40.

The Tieken project is scheduled to start in 1983, and is located in western Routt County south of Hayden, Colorado. This mine would utilize underground mining methods.

The McGregor project is located south of Milner, Colorado. This will be a strip mine.

Energy No. 1 underground mine is scheduled to start in 1985 and is located in Routt County, Colorado, approximately 20 miles southwest of Steamboat Springs.

The Energy No. 3 underground mine, which is scheduled to start in 1981, is located in Routt County.

The Mapco operation is scheduled to start in 1981 and is located about three miles south of Milner, Colorado.

All of these planned operations would expect an annual production of approximately 5.7 million tons by 1990.

NORTHERN MINERALS COMPANY

Northern Minerals Company is currently producing coal approximately five miles north of Meeker, Colorado. With proposed mine expansions, the annual production rate is expected to reach 1.2-million tons by 1990.

PEABODY COAL COMPANY

Seneca Coal Ltd., a joint venture between Peabody Coal Company and Western Utility Coal Company, has been producing coal near Hayden, Colorado since 1964. Proposed production expansion would give an annual rate of 2.0 million tons by 1990.

PITTSBURG-MIDWAY COAL MINING COMPANY (P&M)

This company, a wholly-owned subsidiary of Gulf Oil Corporation, currently operates the Edna surface coal mine just north of Oak Creek, Colorado. The P&M mines are expected to produce approximately 2.5 million tons annually by 1990.

ROCKCASTLE COMPANY

The Rockcastle Company plans to open a surface mine in 1980, approximately seven miles southeast of the Hayden Power Plant. The 1990 annual production rate is expected to be approximately 250,000 tons.

SHERIDAN ENTERPRISES, INC.

Sheridan Enterprises, Inc., plans to start an underground operations four miles northwest of Oak Creek, Colorado, just west of P&M's Edna mine. The mine is anticipated to produce 280,000 tons per year by 1990.

SUN COAL COMPANY

Sun Coal Company operates the Meadows No. 1 surface mine approximately 16 miles west of Steamboat Springs near U. S. Highway 40. Sun Coal also has tentative plans for an underground mine in the vicinity of existing operations. The anticipated production level by 1990 is 200,000 tons.

SUNLAND COAL COMPANY

Sunland Coal Company operates the Apex underground mine approximately five miles northwest of Oak Creek in Routt County. The 1990 production rate is expected to reach 100,000 tons.

UTAH INTERNATIONAL

Utah International operates the Trapper coal mine, a surface mine located just south of Craig, Colorado. With the proposed development of an underground mine, the 1990 production rate is expected to reach 3.36-million tons.

W. R. GRACE and COMPANY

This company operates the Hayden Gulch mine located in Routt County, Colorado, approximately 10 miles south of Hayden. The 1990 production rate is expected to reach 1.0 million tons.

ANSCHUTZ COAL COMPANY

Anschutz proposes to extend workings of its existing private coal operations. The proposed operation would last 30 years and employ 320 people at full production of one million tons per year. The mines are located four miles southwest of Carbondale, Colorado, in Pitkin County.

WYOMING FUELS

Wyoming Fuels operates the Canadian strip mine located in Jackson County, and about nine miles east of Walden, Colorado. With proposed mine expansion, the 1990 production rate is expected to reach 240,000 tons.

KERR COAL

Kerr Coal operates the Marr strip mine located in Jackson County, and about 10 miles east of Walden, Colorado. Proposed production rate indicates that 840,000 tons annually will be required by 1985.

PLANNED ENERGRY-RELATED GROWTH PROJECTS

MOON LAKE PROJECT and POWER PLANT

Deseret Generation and Transmission Cooperative plans to develop an underground mine on federal leases held by Moon Lake Electric Association, one of the members of Deseret. Production of about 1.2 million tons per year beginning in 1983 or 1984 is expected from these lands about seven miles northeast of Rangely, Colorado. The coal will be burned in a new power plant planned to be built near Bonanzo, Utah.

W. R. GRACE METHANOL PROJECT

W. R. Grace Company is studying the feasibility of building a methanol plant on private land just southwest of Craig, Colorado, near the present Colowyo coal mine. 3.5 to 4.0 million tons of coal per year would be required to produce the methanol, and 3.5 to 4.0 million more tons of coal would be transported in pipelines in a slurry with the methanol. The basic decision to proceed with this project will be made in 1980, with earliest production in 1985.

OIL and GAS

Present Situation

There were 1,174 producing oil and/or gas wells in 1978 (new figures for 1979 will be available in August 1980), in the area comprised of Routt, Moffat, Jackson, Rio Blanco and Garfield Counties, an increase of 115 wells over 1977.

These wells were producing 22.8 million bbls (barrels) of oil and 58.53 million MCF (thousand cubic feet) of natural gas in 1978, broken by county as follows:

County	Number of Producing Wells	Oil Production (bbls)	Gas Production (MCF)
Garfield	68	398	3,877,022
Jackson	86	331,995	2,540,489
Moffat	206	561,459	22,087,702
Rio Blanco	796	21,742,980	29,976,491
Routt	18	161,263	44,793
Total	1,174	22,798,095	58,526,497

The total cumulative production for the area, as of January 1, 1979, was:

Garfield	1,006	36,509,921
Jackson	12,427,031	658,084,536
Moffat	54,476,758	503,540,069
Rio Blanco	677,926,144	1,102,307,441
Routt	4,725,585	626,803
Total	749,556,524	2,301,068,770

Approximately 2 percent of the oil and 32 percent of the natural gas is produced from Federally-owned petroleum resources. The oil production amounts to approximately 58 percent, and the gas production approximately 29 percent of that produced in the entire state of Colorado.

Predicted Growth

The increasing number of notices of intent to conduct oil and gas exploration (seismic) and drilling plans received are clear indications of expanding interest in this area for oil and gas development. Hydrofracturing is now employed to increase the productivity of tight gas sands, especially in Rio Blanco County. This technique has been used extensively for the past three years. Drilling and production have consequently enjoyed rapid growth. It is reasonable to expect an increase in oil and gas activity each year in this area for at least the next few years.

Oil and gas were first discovered in the Piceance Creek Basin in 1930. Several fields have been discovered, but some are presently shut in because production is not great. Many wells penetrate tight, low-porosity formations resulting in small, uneconomic production. Gas is the major commodity produced, with oil being very minor.

Exploration drilling continues to search for additional reserves inferred to be present. Most of the drilling is done using conventional drilling methods. Nuclear fracturing techniques, such as project Rio Blanco in Piceance Basin, have demonstrated the tightness of the Mesa Verde Formation and resulted in less than expected performance of this technique.

PIPELINES

Western Slope Gas Company, a wholly-owned subsidiary of Public Service Company of Colorado, has filed an application for a 200-mile long natural gas pipeline right-of-way from the Piceance Basin to the vicinity of Winter Park on the west side of the Continental Divide just west of Denver. Some of the right-of-way has been approved across public lands, but Western Slope may not proceed with construction immediately.

MAPCO has submitted preliminary route sketches of a proposed 10¾" diameter products pipeline from northwestern New Mexico to southwestern Wyoming. In northwestern Colorado, it appears feasible to require the use of an existing right-of-way corridor in accordance with section 503 of the Federal Land Policy and Management Act (90 Stat. 2743).

BITUMINOUS SANDS

Present Situation

Preliminary geologic investigations have delineated several areas in northwest Colorado, which are potentially valuable for bituminous sands. Most of the deposits are along the Grand Hogback and the Danforth Hills and are low grade.

There are no known valuable deposits, and there is no known present interest in developing the deposits.

Predicted Growth

As technology is developed and petroleum resources are depleted, development of bituminous sands will become a reality.

GEOTHERMAL STEAM - STATEWIDE

Present Situation

Seventeen areas on the Western Slope have been designated as prospectively valuable for geothermal resources. These areas extend from the Steamboat Springs area south through Glenwood Springs to the great volcanic pile of the San Juan Mountains. There are three geothermal lease applications in Routt County and one in Garfield County, and these are the only geothermal lease applications in northwest Colorado. No leases have been issued in this area.

Projected Growth

The focus of industry interest is in the San Luis and Upper Arkansas Valleys in south-central Colorado. Should valuable geothermal resources--for electrical generation or other applications--be discovered, interest in development may be expected to rise sharply on the basis of the nation's and areas thirst for inexpensive, low-pollution, alternate energy sources.

Superficially, the geothermal resource on the Western Slope appears to have less potential. However, it awaits exploration for a more accurate assessment of its prospects.

URANIUM IN NORTHWESTERN COLORADO

Present Situation

Uranium production in Colorado annually makes a significant contribution toward meeting the nation's energy demand. Colorado ranks fourth in the nation in the production of uranium concentrate (U_3O_8) or yellowcake. Production in 1978 exceeded 1.9 million pounds of U_3O_8, up 200,000 pounds from 1976.

Exploration and drilling activities are evident across the state. There was over 4 million feet of exploratory drilling done in Colorado in 1978. Land holdings for exploration and mining total 3,349,000 acres statewide.

Interest in exploration is expanding in northwest Colorado. Active exploration and claim staking is occurring in the Troublesome-Hot Sulphur Springs area near Kremmling and in North Park near Walden.

Uranium has been produced from the Browns Park Formation near Lay and Maybell, west of Craig, in Moffat County, by the Union Carbide Corporation. Above-ground leaching of old open pit mine spoils and tailings accounts for most of Union Carbide's production.

Minor deposits, having no production, occur in Precambrian rocks of the Park Range near Steamboat Springs and in the Dakota Sandstone east of Meeker. The Browns Park (Miocene) Formation continues to be a prime exploration target. Exploration and claim staking in the area has been continuous since the early 1950's.

BLM, in Colorado, is currently involved in processing 11 uranium prospecting permits, which have been filed on acquired lands in the Great Divide Planning Unit in Moffat County. The prospecting permits have been on file with BLM for 5 years, but lack of action by the potential prospectors have precluded their issuance.

Projected Growth

Presently depressed uranium prices will temporarily limit production in northwestern Colorado. Exploration will continue to accelerate in anticipation of future growth in demand. Significant deposits of conventionably mineable uranium have not been discovered in the area, but the development and perfection of in-situ leaching holds promise for the low-grade, minor deposits already delineated.

OTHER MINERALS

NAHCOLITE and DAWSONITE

Present Situation

Interior has issued four sodium leases and has an additional four Preference Right Lease Applications pending, covering these minerals in the Piceance Creek Basin. The leases are within three miles of oil shale lease C-a, and about 10 miles from oil shale lease C-b. The lessee has conducted economic, mining, processing and market studies, and has plans for development of the leases. However, no work is now being done on the leased lands.

It has been reported that Superior Oil Company will produce nahcolite and dawsonite in their private land oil shale development.

Predicted Growth

As the use of coal increases, the development of the nahcolite can be expected to increase for its potential use as a stack scrubber in pollution control.

Since we currently import 90-95 percent of our aluminum, the development of dawsonite and other domestic sources of aluminum is expected to become critical. Indications are that foreign exporters are possibly thinking strongly about taking the same line as the foreign oil producers have recently taken. This could accelerate the development of dawsonite.

SAND and GRAVEL

Present Situation

There is significant demand for sand and gravel, especially in western Rio Blanco County where sources are scattered and in short supply. Several of the known sources are located on public lands. Rio Blanco County has excavated over 100,000 cubic yards of gravel from a site on the White River. The town of Rangely has continued to produce gravel from a free use permit area east of town. Moffat, Grand and Jackson Counties have obtained free use permits to obtain gravel from public lands.

Several small private contractors have purchased sand and gravel from BLM in northwest Colorado. The usual procedure is to purchase the gravel from BLM and then obtain it from one of the operating city or county free use permit areas. This procedure is beneficial to the contractor since he has a limited amount of paper work to contend with, as well as to BLM, because there is no increase in surface disturbance.

Projected Growth

Growth in the sand and gravel industry parallels growth in the construction and mining industries. As the previously-mentioned mineral resources are exploited, the demand for sand and gravel will increase proportionately.

OTHER RESOURCES

WILDLIFE

Present Situation

Over 300 species of wildlife inhabit the region, including mule deer, elk, sage grouse, bald and golden eagles, prairie falcons, 11 species of furbearers, 31 species of waterfowl and shore birds, 20 species of non-game mammals, 220 species of non-game birds and 21 species of fish. Threatened and endangered wildlife include: the peregrine falcon, blackfooted ferret (possible), greater sandhill crane, Colorado River squawfish, humpback sucker and Colorado cutthroat. The Piceance Basin supports one of the largest migratory mule deer herds in North American (20,000+ animals), and serves as a wintering area for one of the largest concentrations of bald eagles in the western United States.

Game animals produce 213,000 hunter days for some 37,000 hunters. Mule deer alone provide a harvest of over 20,000 animals, and 160,000 recreation days for 28,000 hunters from 28 states.

Predicted Impact

Major public concern is for the future of the mule deer herd. Elimination of winter habitat, as well as increased human activity, will adversely affect the herd and the economic base it now provides. Other wildlife in the region will be similarly affected.

RANGE MANAGEMENT

WILD HORSES

Present Situation

Helicopter counts made during the 1979 winter indicate there are 925 horses in the Northwest Region. Actual counts were adjusted for customary errors in helicopter census. Horses are disbursed as follows:

Sand Wash	300
Piceance Basin	425
Douglas Creek	200

In addition, the Grand Junction District reports some 85 horses in the Bookcliffs area.

It is estimated that the population of the herds is increasing 20-25% per year due mainly to the protective status provided by the Wild and Free Roaming Horse and Burro Act.

Predicted Impact

The law requires that the animals be protected. This may require that an area be set aside for their use and that some be removed as numbers increase beyond habitat capability. The increase in human activity in the area will adversely affect the free-roaming nature of the animals. It will also tend to concentrate the horses on only a portion of their normal range which will, in effect, support a smaller herd.

LIVESTOCK MANAGEMENT

Present Situation

The entire region is grazed by domestic livestock and is administered by two Resource Areas. A portion of the Oil Shale Region is in the Grand Junction District. A draft grazing Environmental Statement has been prepared for the White River Resource Area and the Little Snake Resource Area Statement is scheduled for 1985.

Predicted Impacts

Energy development and related activities would affect the livestock industry of Northwest Colorado. The increase vehicle traffic would increase the death loss due to collision with vehicles in some areas. The loss of vegetative productions due to surface mining could be significant to the individual operator; however, only a slight impact would be realized regionally. The quantity and quality of water for livestock use could also be affected by energy development.

WATER

Present Situation

The region is noted for its clear streams which provide high quality water for various purposes, such as domestic use, power generation, agriculture, recreation, fish habitat and industry. The Colorado, Yampa and White Rivers are the main drainages of the region and are of the greatest concern as regards development. At the present time, there is an excess of water in relation to use, but this will change drastically as mineral development accelerates. More information is needed, however, there is some indication that ground water reserves may be adequate to meet demands by the oil shale industry.

Predicted Impact

The long-term effect of industrialization in the region will cause a general decline in water quality with impacts focused on the White and

Colorado Rivers. The degree of severity cannot be quantified at this time, but will depend heavily on continuing research and monitoring. In addition, there will be increased competition for use of water. Industry will require large amounts of water to produce energy minerals, plus additional amounts for power generation, and revegetation efforts. As the population of the region expands, there will be increased demands for water for urban and municipal uses. Land uses will probably change as water rights are acquired and diverted from uses, such as agriculture to energy minerals production. Additional reservoirs will probably be built to meet the water demands of the region, and some ground water reserves will be dewatered.

Depending upon the outcome of an ongoing court case involving ground water ownership, the BLM may have to become very heavily involved in water leasing and ground water regulation.

ARCHAEOLOGY and HISTORIC RESOURCES

Present Situation

Cultural resource values in the northwest region of Colorado are largely unknown since little work has been done on an area basis. Recent studies done in the Piceance Creek Basin indicate that the area has an extensive cultural resource, but a great deal more needs to be done before its significance can be understood. To date, many significant archaeological, historic or scientific finds have been identified in the region.

In Fiscal Year 1980, the Forest Service and BLM are cooperating in a Class I inventory study which will synthesize the state of existing knowledge and our knowledge needs. This study will enable the BLM and FS to judge the value comparatively of the many cultural resources of the northwestern region of Colorado.

The Fremont culture is known to have inhabited the region. Their nomadic nature make it difficult to inventory and understand their culture.

Predicted Impacts

Cultural resource legislation makes it mandatory to perform cultural examinations (archaeological, historical, paleontological) on "any Federal construction project or Federally-licensed project, activity or program." Since little is known regarding the cultural resource values of this region, it is anticipated that funding for inventory, evaluation, documentation, consultation (36 CFR 800), and data recovery will be required. Some cultural resource localities will probably be destroyed either through mining activity, or from increased human activity in the region, but their values may be recovered through data recovery and report publication so that the public may enjoy the value despite loss of the locality.

RECREATION

Present Situation

The most significant recreational uses in the region are winter sports, big game hunting -- largely for mule deer, elk and antelope, river rafting, and various types of off-road vehicle use. Other important recreational opportunities include fishing, bird hunting, skiing, snowmobiling, river running, rock hounding, sightseeing and dude ranch activities. Archaeological sites have recently been identified in Piceance Creek Basin, but are not considered significant finds at this time.

Predicted Impacts

The quality and ultimate value of the area's complement of recreational opportunities will be affected by increased mineral development, increased population, etc., both adversely and beneficially. Development of a comprehensive minerals development and monitoring plan would help mitigate adverse, and also to ensure that the beneficial effects are most positive. Increased development and availability of urban and semi-urban recreation opportunities in rapidly growing communities, maintenance of existing access and securing additional access to the public lands for recreation users, and increased managerial commitments to on-the-ground maintenance of these recreational opportunities will be essential for satisfying growing public demands for outdoor recreation.

COMMUNITY EXPANSION

Anticipated growth at Rangely, Colorado, required public land for a large, new school, and for a new, large, public recreation facility. Public lands have been leased, and subsequently sold to the Town and the Recreation District to accommodate this need.

Additional public land area has been classified in anticipation of town expansion needs, and some of this has been requested for a rodeo grounds facility.

SOCIAL-ECONOMIC

Present Situation

Oil shale development at Tract C-a and C-b and other sites, together with coal and other energy-related development, would affect a five-county area in northwestern Colorado and eastern Utah. Principal cities in this roughly 18,000-square mile area are Craig, Rangely, Meeker, Rifle, Glenwood Springs, Grand Junction, Fruita and Vernal (in Colorado, Moffat, Rio Blanco, Garfield, and Mesa Counties, and Uintah County in Utah).

Population figures for the region indicate a steady growth rate from 1970 to 1977; nonetheless the area remains primarily rural in character. Grand Junction is the largest city in the region, with a population exceeding 27,500. It is the Mesa County seat and serves as a commercial and distribution center for the region, with a number of wholesale supply firms, a medical and educational center, and a broad array of professional services. In general, Grand Junction and Fruita, as well as Vernal and Glenwood Springs, have received only indirect impacts due to energy development in northwest Colorado. Contrary to earlier professional predictions, the migrants to the region did not settle in the larger towns, which, theoretically, would have been better prepared to incorporate an influx of people. Instead, energy-related immigrants to the area have tended to settle as close to their respective development site as it was possible for them to get. Of the eight communities, Craig, Meeker, and Rangely have received the heaviest impact, mostly due to coal development in the area. Infrastructure facilities have been able to handle the population increases to date; however, if the current rate of development continues, it is estimated that some of these facilities will require expansion (i.e., water, sewer) by 1980-81. Housing availability has proven to be the most obvious problem. Housing construction has been unable to keep up with increasing demands for single-family dwelling units. As a result, the number of mobile home units has risen dramatically, at present accounting for at least 15 percent of all housing units in each city (versus an 8 percent minimum in 1970). School facilities have also shown some signs of strain, especially in Craig, where classroom capacity was exceeded in 1978. Mobile classroom units have been utilized to alleviate the overcrowding. Impacts in Rifle have been chiefly due to shale oil development, resulting in a population increase of 30 percent in a 15-month period. Undoubtedly, the gearing up of the Superior, C-a and C-b oil shale tracts will herald the advent of major impacts on Rifle.

Between 1970 and 1977, there was a significant increase in the proportion of 20-34-year-olds in the region. This increase reflects the influx of young mining, oil field, and construction workers (predominantly male occupations). Nonetheless, the racial characteristics of the area haven't changed; the population remains predominantly white in composition.

Over the past twenty years, the dependency of the area on agriculture as a source of employment and income has decreased substantially. The role of manufacturing has increased, but remains insignificant as a source of local employment and income. Mining employment (i.e., coal, oil and gas, oil shale extraction), and state and local government accounts for about half of the employment and income in the local economy. The unemployment rate for the area in 1977 was quite low for Rio Blanco County (3.0 percent), whereas Moffat County's was quite high (8.0 percent) as compared to the state as a whole (5.6 percent). Rio Blanco County's extremely low unemployment rate was the result of diminishing population and labor force rather than the expansion of employment opportunities. The high unemployment rate in Moffat County reflects the large number of people who have moved into the area seeking employment in service sectors (in anticipation of an economic boom). This influx has exceeded the immediate capability of the local economy to absorb.

Oil and gas was the most important source of 1977 wage and salary earnings in Rio Blanco County. While coal mining earnings were similarly important in Moffat, they were eclipsed in 1977 by construction, which contributed 44.9 percent of total wage and salary earnings. Such a great degree of dependence on construction earnings makes the area economically very vulnerable to fluctuations in the construction sector. While trades, services, and local/state government account for much employment in the region, they are not proportionally important as sources of income due to relatively low average earnings levels.

Residents of each community in the area expressed support for energy development. The respondents were aware of the negative aspects of energy developed (i.e., traffic congestion, strain on housing and community services, increased crime and delinquency, inflation), but insisted that past development had been good for the area. Specifically, the availability of jobs has permitted residents to upgrade their occupations and has allowed the young people to remain in the area. The increased energy-related population has attracted more business and services to the area. Most of the residents concur that development is inevitable; people are very much aware of the energy crisis that faces this country and accept the idea that coal, gas, oil, and uranium resources of the area will have to be developed. However, while the residents favor continued development, they do not support rapid, uncontrolled growth. Most reported that they favored a gradual expansion of energy development so that the impacted communities would have more time to absorb the additional population and to provide residents with the necessary community services. It is felt that federal and state assistance is the only feasible way for the communities to prepare to provide community services for the rapidly expanding population which is likely to occur with extensive energy development.

Predicted Impacts

Expected impacts during construction and operation of major energy facilities, and the resulting inability of communities to handle the impacts include lack of front-end money to meet community needs before the tax base is in place; rapidly increasing demand for community services; immediate housing shortages as workers arrive to build the plants or mines; and increases in social problems associated with unplanned, explosive growth.

Social and economic impacts won't be limited to communities; farmers, ranchers and orchardists will also be affected. Energy development tends to dry up the agricultural labor supply, not just in the immediate area, but halfway across the state. Additional people will put pressure on agricultural land and water above the direct needs of the energy industry. Residents prefer to see energy development unfold on the Western Slope in a way that does not destroy agriculture. Indeed, the economic and social stability that agriculture provides will be vital to developing a synthetic fuels industry in the West.

It is anticipated that a 400,000-barrel-per-day oil shale industry, as proposed by the President, would add 70,000 to 75,000 people to the region's existing population base of 14,500 by the year 2010. This five- to six-fold population increase in the energy area, over a period of a decade, would cost over $400 million in community services alone, exclusive of housing needs.

Construction of highways in the oil shale counties would cost well in excess of $100 million to meet the needs associated with the President's goals.

The oil shale industry, through bonus payments for energy mineral leases, has made possible a unique $63 million Colorado "Oil Shale Trust Fund" which, coupled with $16 million paid annually from other bonus and royalty BLM receipts to the State Treasurer, are available now for community energy-impact support. In addition, Colorado counties receive direct payments of nearly $8 million annually under the Payments in Lieu of Taxes Act of 1976. Rio Blanco County, for example, received in excess of $150,000, and Moffat County in excess of $160,000 under the In Lieu of Taxes payment system for FY 1978. Nonetheless, figures of $500 million for highways and community services will tax the state and local governments beyond their ability. To date, no comprehensive programs exist at the federal, state or local level to equip impacted areas to deal with such rapid expansion.

The issue of explosive, unplanned growth not only affects the people living in the community, but the productivity of the industry, itself. Chaotic community conditions will thwart an expeditious synthetic fuels program simply because companies will not be able to attract or keep quality workers. Eventually, communities will not look favorably on participating in synthetic fuel development.

Enough studies have been done to demonstrate that this productivity decline occurs during the construction, as well as the operating phase, a situation that can also contribute to large-cost overruns. It is, therefore, believed that the costs of the development could escalate dramatically if the essential community planning and services are not in place. For example, in the construction of the Jim Bridger Power Generating Facility in Rock Springs, Wyoming, the company suffered greatly from productivity problems due to social disruption. Some observers have estimated that the impact of this productivity decline nearly doubled the originally estimated cost of the plant.

A national synthetic fuels program cannot treat such compelling social issues as an afterthought. We must incorporate successful community and housing programs, pacing the development accordingly, if we are to make this national effort work.

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